इंटरनेट मानक

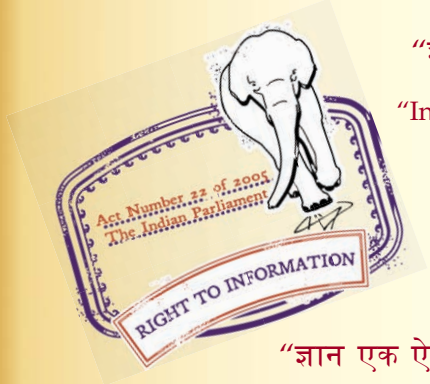
Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 617 (1994): Aluminium and aluminium alloy ingots and castings for general engineering purposes [MTD 7: Light Metals and their Alloys]



"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS 617 : 1994
(Superseding IS 20 : 1977)
(Reaffirmed 1999)

भारतीय मानक

ढलवां एल्युमीनियम और उसकी मिश्रधातुएँ — सामान्य इंजीनियरी प्रयोजनों के लिए इंगट और ढलाइयाँ — विशिष्टि

(तीसरा पुनरीक्षण)

Indian Standard

CAST ALUMINIUM AND ITS ALLOYS — INGOTS AND CASTINGS FOR GENERAL ENGINEERING PURPOSES — SPECIFICATION

(Third Revision)

Second Reprint MARCH 1998

UDC 669·71-412/14

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 1994

Price Group 6

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Light Metals and Their Alloys Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1955 and subsequently revised in 1959 and 1975. This standard supersedes IS 20 : 1977 'Cast aluminium and aluminium alloys for manufacture of utensils (*third revision*)'. In this revision, following modifications have been made:

a) Amendments No. 1 to 3 have been incorporated,

b) Old alloy designations have been deleted,

c) New temper designations have been incorparated (*see* Annex B for comparison of old and new tempers),

d) Requirements of physical properties have been modified,

e) Requirements of alloy designation 4528 and 4628 have been included,

f) Requirements of investment casting have been included, and

g) Requirements of alloy designations for utensils have been included.

Guidelines for selection of different alloys for common use and special application have been given in Annex C for guidance only.

This standard contains clauses **6.1.2**, **6.2**, **7.2.1**, **7.2.2**, **8.1**, **8.2**, **10.1.1**, **11**, and **13.2** which provide discretion to purchaser or call for agreement between the supplier and the purchaser.

While revising this standard assistance has been drawn from BS 1490 : 1988 'Aluminium and aluminium alloy ingots and castings for general engineering purposes'.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

CAST ALUMINIUM AND ITS ALLOYS — INGOTS AND CASTINGS FOR GENERAL ENGINEERING PURPOSES — SPECIFICATION

(Third Revision)

1 SCOPE

This standard covers the requirements of cast aluminium and its alloys in the form of ingots and castings for general engineering purposes.

2 REFERENCES

The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

3.0 For the purpose of this standard, the following definitions as given in IS 5047 (Part 1) : 1986 or otherewise shall apply.

3.1 Cast

The product of either one furnace melt, or a number of furnace melts where such are aggregated and mixed prior to sampling or pouring.

3.2 Casting

Metallic shapes formed by pouring molten metal into a mould.

3.2.1 *Chill Casting*

A casting formed in a metallic mould.

3.2.1.1 *Gravity die casting*

A chill casting in which the molten metal is introduced by gravity.

3.2.1.2 *Low pressure die casting*

A chill casting in which the molten metal is introduced by a low pressure feed.

3.2.1.3 *Pressure die casting*

A chill casting in which the molten metal is introduced under high pressure.

3.2.2 *Investment Casting*

A casting formed from an expendable pattern which has been invested in a suitable mould material.

3.2.3 *Sand Casting*

A casting formed in a sand mould.

3.3 Ingot

A cast solid product of specific size, shape and chemical composition of metal or alloy intended for remelting.

4 SUPPLY OF MATERIAL

General requirements relating to the supply of material shall conform to IS 10259 : 1982.

5 CHEMICAL COMPOSITION

5.1 The chemical composition of cast aluminium and its alloys shall conform to the requirement given in Table 1.

5.2 Aluminium and aluminium alloy designations 1900, 4300 and 5230 in M condition are suitable for manufacture of cast utensils provided bismuth and lead are restricted to 0.5 percent.

5.3 The chemical analysis shall be carried out in accordance with IS 504 : 1963, IS 7658 : 1975, IS 11035 : 1984 or any other established instrumental/chemical method. However, in case of dispute the procedure specified in latest edition of IS 504 shall be the referee method.

6 MECHANICAL PROPERTIES OF CASTINGS

6.1 Tensile Properties

6.1.1 The tensile properties of separately cast test samples shall conform to the requirements given in Table 2.

6.1.2 In case of non-availability of separately cast test samples, test piece machined from the castings may be tested. The form, size and location of test pieces, and the minimum mechanical test values to be obtained from them, shall be as agreed to between the supplier and the purchaser. However agreed value tensile properties should not be less than 75 percent of the specified value.

6.1.3 The separately cast test samples shall conform to following forms.

6.1.3.1 *Sand castings*

The test samples shall be cast in dry sand moulds which, except in the case of Alloy 5500, shall have internal dimensions as shown in Fig. 1 or 4. The moulds shall be inclined from the vertical at the commencement of pouring and the metal shall be poured into the top of the moulds. The sand of the moulds may be rammed into any convenient container (such as a steel tube), provided that the test sample is separated from the container walls by not less than 27 mm of sand. In the case of Alloy 5500, the mould of test sample shall have the dimensions as shown in Fig. 3.

6.1.3.2 *Chill castings*

Where the castings are produced from metallic moulds or dies, the test samples shall be cast in metallic moulds having dimensions shown in Fig. 1 or 2.

6.1.3.3 *Investment castings*

The test samples shall be cast in moulds of similar material, under similar conditions to those of the castings represented. The moulds used shall have the dimensions given in Fig. 5 or 6.

Table 1 Chemical Composition of Cast Aluminium and Its Alloys

(*Clause* 5.1)

Percent by mass (Values given are maximum unless shown otherwise)

Sl No.	Designation[1]	Copper	Silicon	Magnesium	Iron	Manganese	Nickel	Zinc	Lead	Tin	Titanium	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1.	1900	0.2	0.5	0.05	0.6	0.2	0.1	0.1	0.05	0.05	–	99.0 *Min*
2.	1950	0.03	0.3	0.03	0.4	0.03	0.03	0.07	0.03	0.03	–	99.5 *Min*
3.	2280	4.0-5.0	0.25	0.1	0.25	0.1	0.1	0.1	0.05	0.05	0.2-0.3	Remainder
4.	2285[2]	3.5-4.5	0.7	1.2-1.8	0.7	0.6	1.7-2.3	0.1	0.05	0.05	0.2	Remainder
5.	2550	9.0-11.0	2.5	0.2-0.4	1.0	0.6	0.5	0.8	0.1	0.1	0.2	Remainder
6.	4223	2.0-4.0	4.0-6.0	0.15	0.8	0.2-0.6	0.3	0.5	0.1	0.1	0.2	Remainder
7.	4223A	2.8-3.8	4.0-6.0	0.05	0.6	0.2-0.6	0.2	40.15	0.1	0.05	0.2	Remainder
8	4225	1.0-1.5	4.5-6.0	0.3-6.0	0.8	0.5	0.3	0.5	0.2	0.1	0.2[3]	Remainder
9.	4300	0.1	4.5-6.0	0.1	0.6	0.5	0.1	0.1	0.1	0.05	0.2	Remainder
10.	4323	3.0-5.0	5.0-7.0	0.1-0.3	1.0	0.2-0.6	0.3	2.0	0.2	0.1	0.2	Remainder
11.	4420	3.0-4.0	7.5-9.5	0.3	1.3	0.5	0.5	3.0	0.3	0.2	0.2	Remainder
12.	4423	1.5-2.5	6.0-8.0	0.3	0.8	0.2-0.6	0.3	1.0	0.2	0.1	0.2	Remainder
13.	4450	0.1	6.5-7.5	0.20-0.45	0.5	0.3	0.1	0.1	0.1	0.05	0.2[3]	Remainder
14.	4520	0.7-2.5	9.0-11.5	0.3	1.0	0.5	0.5	2.0	0.3	0.2	0.2	Remainder
15.	4525	2.0-4.0	8.5-10.5	0.5-1.5	1.2	0.5	1.0	1.0	0.2	0.1	0.2	Remainder
16.	4528	1.75-2.5	8.5-9.5	0.15	0.4-0.6	0.8	0.8	0.5	0.1	0.1	0.2	Remainder
17.	4600	0.1	10.0-13.0	0.1	0.6	0.5	0.1	0.1	0.1	0.05	0.2	Remainder
18.	4600A	0.4	10.0.13.0	0.2	1.0	0.5	0.1	0.2	0.1	0.1	0.2	Remainder
19.	4628	1.75-2.5	11.0-12.5	0.3	0.7-1.1	0.5	0.3	1.5	0.05	0.1	0.2	Remainder
20.	4635	0.1	10.0-13.0	0.2-0.6	0.6	0.3-0.7	0.1	0.1	0.1	0.05	0.2	Remainder
21.	4652	0.7-1.5	10.0-12.0	0.8-1.5	1.0	0.5	0.7-1.5	0.5	0.1	0.1	0.2	Remainder
22.	5230	0.1	0.3	3.0-6.0	0.6	0.3-0.7	0.1	0.1	0.05	0.05	0.2	Remainder
23.	5500	0.1	0.25	9.5-11.0	0.4	0.1	0.1	0.1	0.05	0.05	0.2	Remainder

[1] Designations shall be as given in IS 6051 : 1970.

[2] Chromium content in this alloy shall not exceed 2 percent.

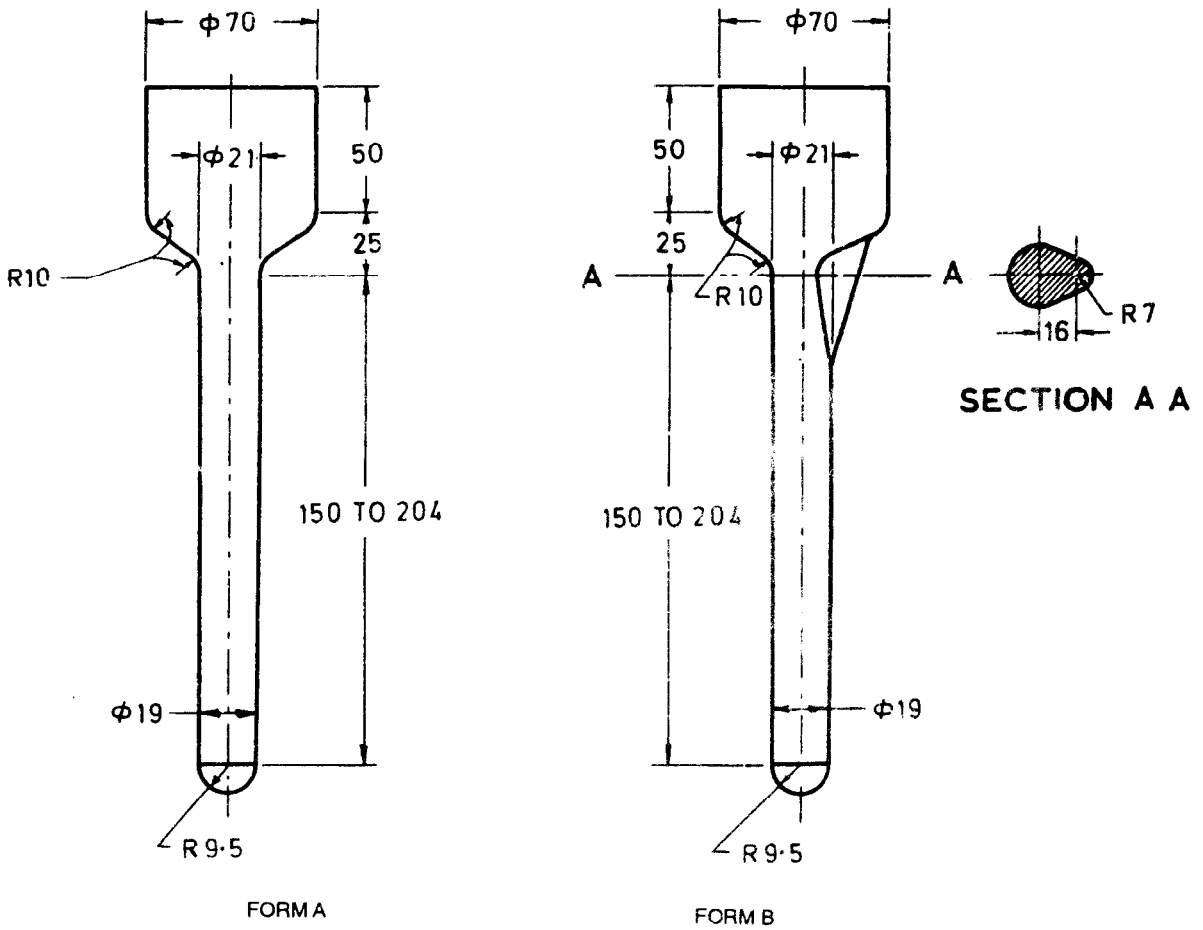
[3] Titanium content, if present, shall be not less than 0.05 percent

Table 2 Tensile Properties of Cast Aluminium and Its Alloys

(*Clause* 6.1.1)

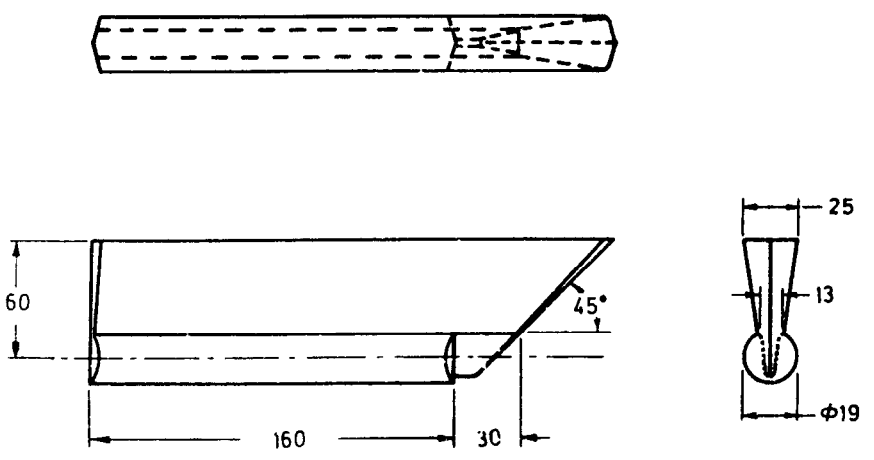
Sl No.	Designation	Condition	Tensile Strength MPa		Percentage Elongation on $5.65\sqrt{S_o}$ or 50 mm Gauge Length	
			Sand Cast *Min*	Chill Cast *Min*	Sand Cast *Min*	Chill Cast *Min*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	**1900**	M	–	–	–	–
2.	**1950**	M	–	–	–	–
3.	**2280**	T4	215	265	7	13
		T6	275	310	4	9
4.	**2285**	T6	215	280	–	–
5.	**2550**	M	–	170	–	–
6.	**4223**	M	140	160	2	2
		T6	225	280	–	–
7.	**4223A**	T4	–	245	–	8
8.	**4225**	T4	175	230	2	3
		T6	230	280	–	–
9.	**4300**	M	120	140	3	4
10.	**4323**	M	160	175	1	1
11.	**4420**	M	–	180	–	1.5
12.	**4423**	M	140	160	1	2
13.	**4450**	M	135	160	2	3
		T5	160	190	1	2
		T7	160	225	2.5	5
		T6	225	275	–	2
14.	**4520**	M	125	150	–	–
15.	**4525**	T5	–	210	–	–
16.	**4528**	M	150	220	1.0	1.5
		T5	140	200	1.5	3.0
		T6	–	320	–	2.0
17.	**4600**	M	165	190	5	7
18.	**4600A**	M	165	190	5	5
19.	**4628**	M	–	270	–	1.5
20.	**4635**	M	–	190	–	3
		T5	170	230	1.5	2
		T6	240	295	–	–
21.	**4652**	T5	–	210	–	–
		T6	140	200	–	–
		T7	175	280	–	–
22.	**5230**	M	140	170	3	5
23.	**5500**	T4	275	310	8	12

NOTE – The tensile properties obtained from separately cast samples do not necessarily represent the properties obtainable from all parts, or in all directions, of a casting, which will depend on a number of factors including wall thickness and cooling characteristics.



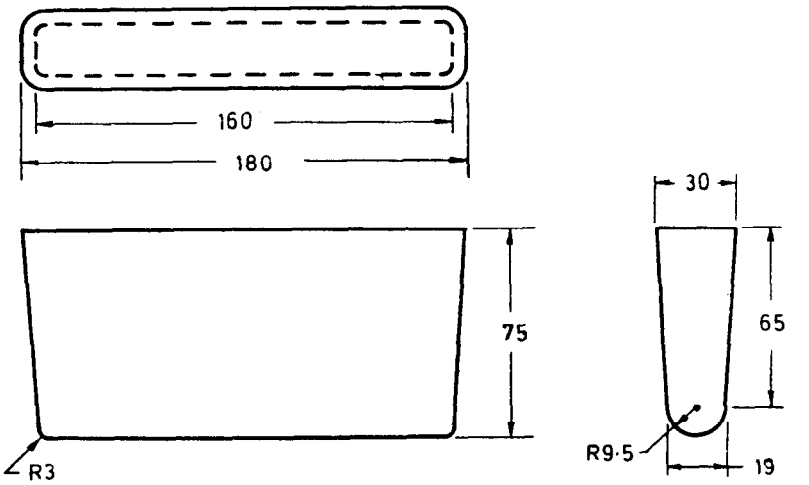
All dimensions in millimetres.

FIG. 1 SAND OR CHILL-CAST TEST SAMPLES – FORMS A AND B



All dimensions in millimetres.

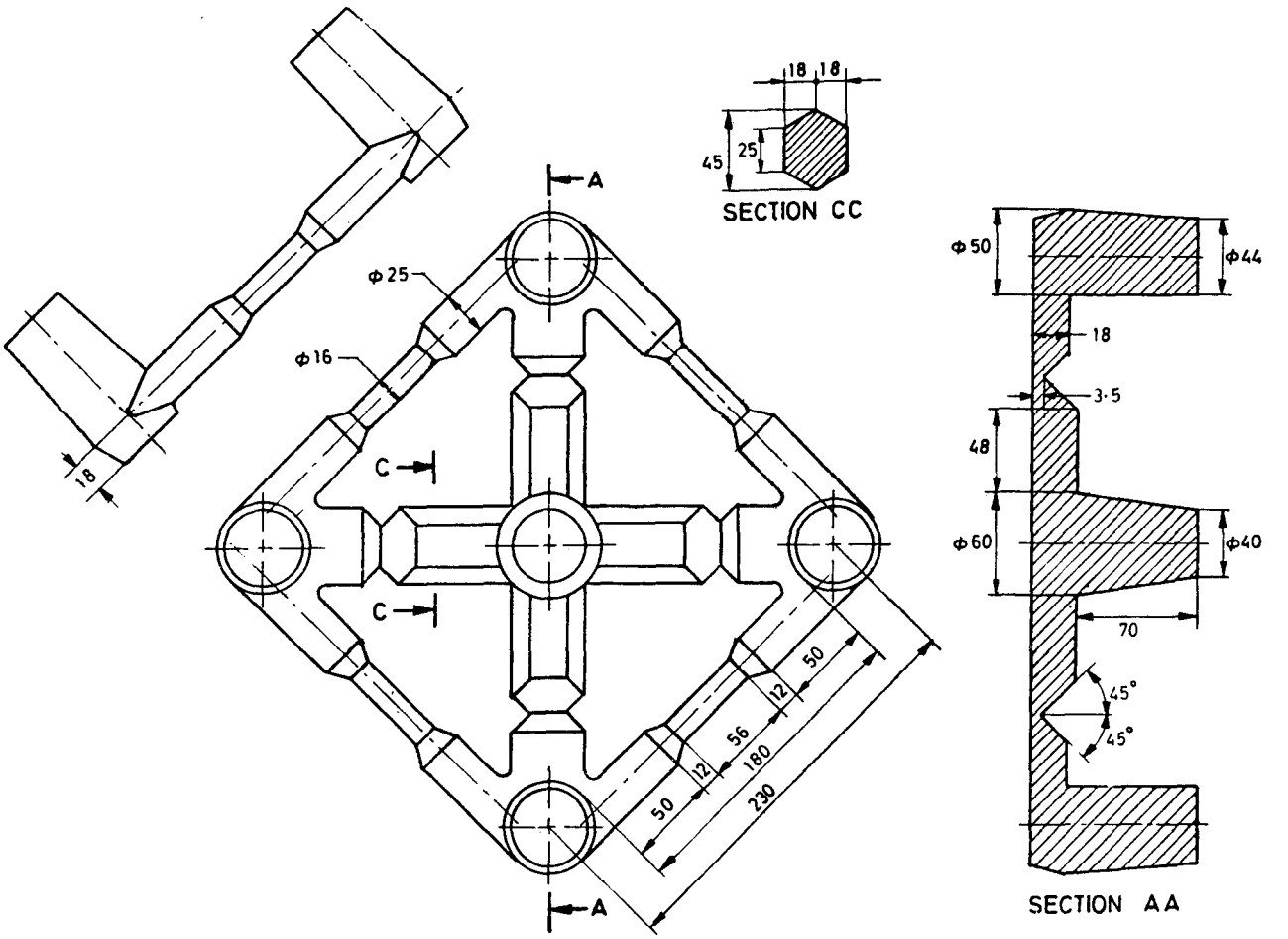
FIG. 2 CHILL-CAST TEST SAMPLES – FORMS C AND D – *Contd*



FORM D

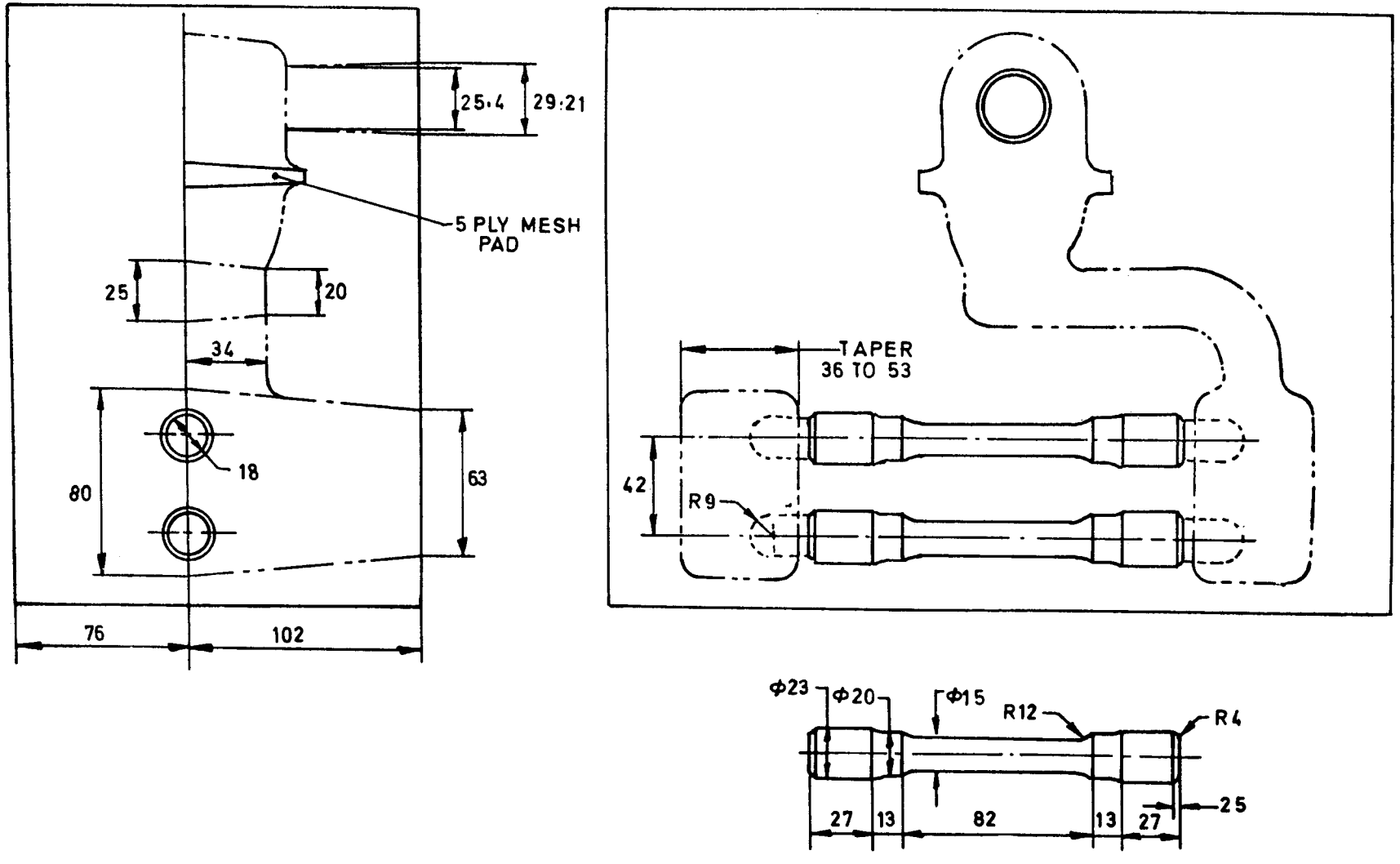
All dimensions in millimetres.

FIG. 2 CHILL-CAST TEST SAMPLES — FORMS C AND D



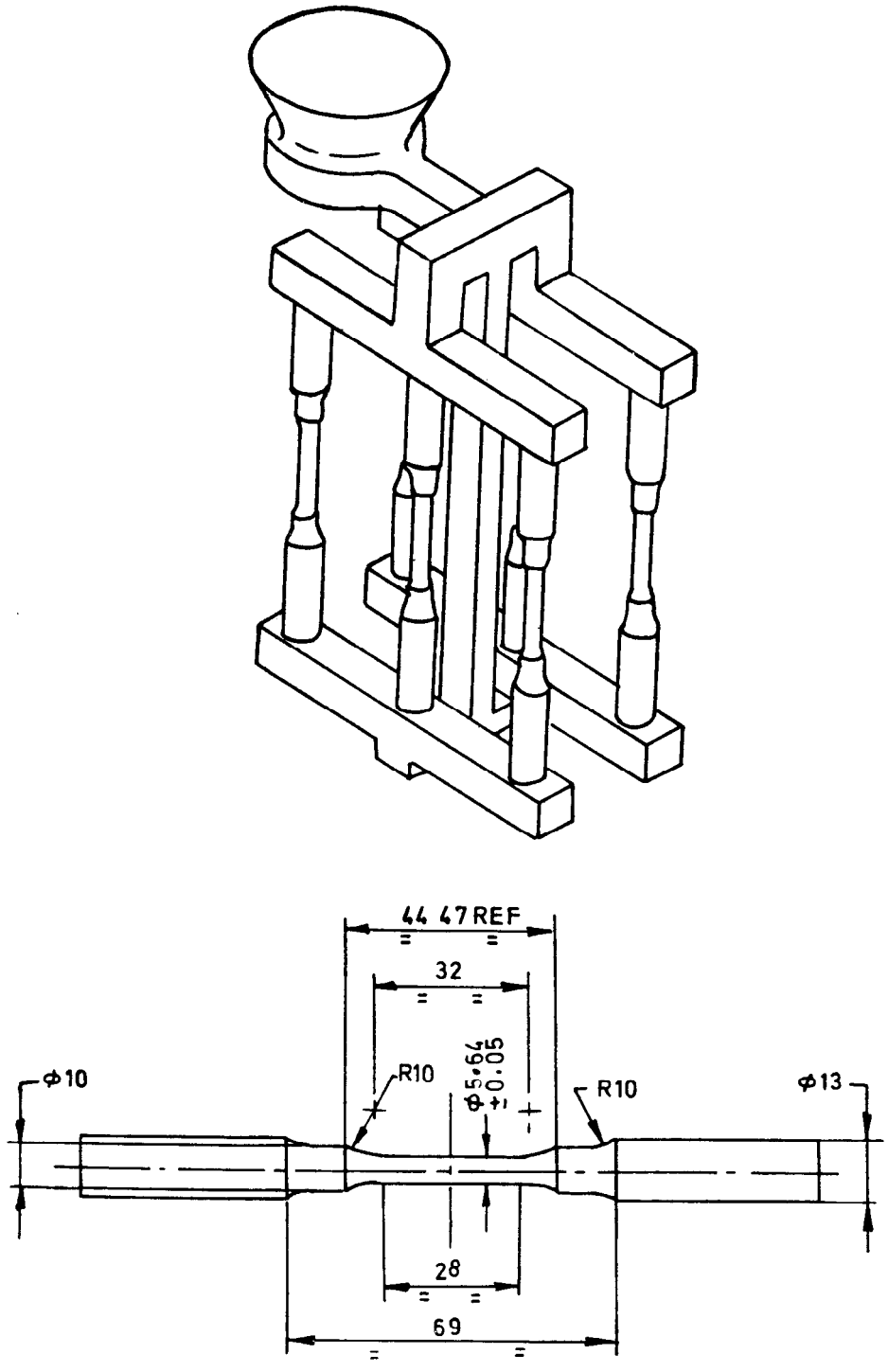
All dimensions in millimetres.

FIG. 3 SAND-CAST TEST SAMPLE — FORM E



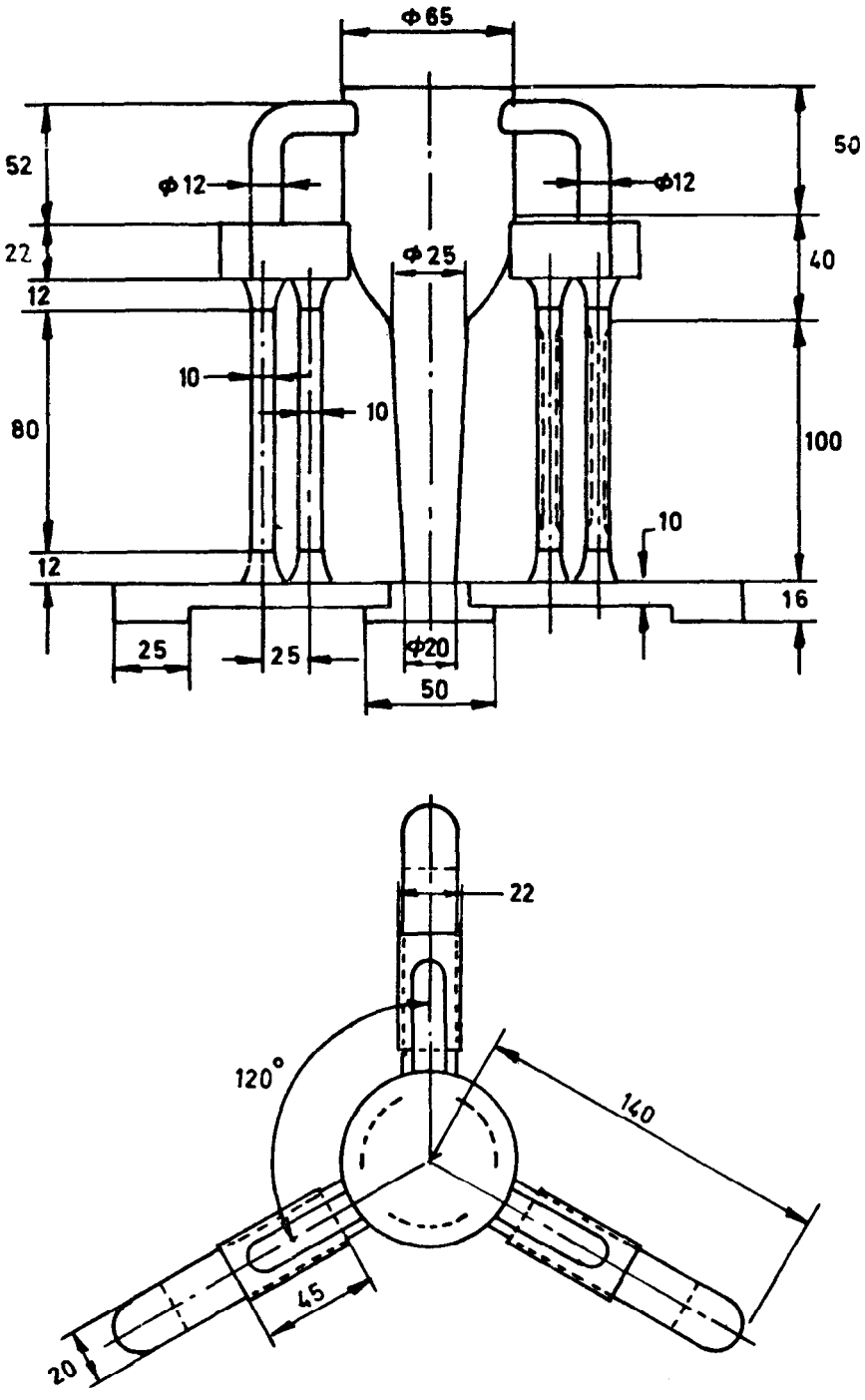
All dimensions in millimetres.

FIG. 4 SAND-CAST TEST SAMPLE — FORM F



All dimensions in millimetres.

FIG. 5 INVESTMENT-CAST TEST SAMPLE — FORM G
(CAST TO SIZE)



All dimensions in millimetres.

FIG. 6 INVESTMENT-CAST TEST SAMPLE — FORM H

6.1.4 The tensile test shall be carried out in accordance with IS 1816 : 1979 on round test pieces of dimensions given in Fig. 7 after machining from the cast test samples.

6.1.5 Should a test piece break outside the middle half of the gauge length and does not meet the requirements of mechanical properties, the test shall be discarded and another sample tested.

6.2 Hardness

Hardness testing (*see* IS 1500 : 1983) is recommended for general assessment of uniformity of supply of castings and not ingots. When hardness tests are agreed to between the supplier and the purchaser the agreed minimum and/or maximum values shall appear on the drawing/test schedule/order, together with the details of location, the size of the indenter and the load to be used.

7 FREEDOM FROM DEFECTS

7.1 Ingots

The ingots shall be clean and free from harmful defects.

7.2 Castings

The castings shall be clean, sound and free from harmful defects.

7.2.1 Each casting shall be inspected for cracks. The dye penetrant test (*see* IS 3658 : 1981) process may be used to detect cracks if required by the purchaser and standard of acceptance shall be mutually agreed to between the supplier and the purchaser. The castings may be repaired by the supplier without detriment to the ultimate use of the casting, but the decision to repair the type of defect should be mutually agreed to between the supplier and the purchaser.

7.2.2 Radiolography/Ultrasonic tests may be applied in special cases subject to agreement beetween the purchaser and the supplier. The details of the techniques to be used, the frequency of inspection and standards of acceptance should be mutually agreed.

8 CONDITION

8.1 The castings shall be supplied in any of the conditions covered in Table 2 as specified by the purchaser. The condition (Temper) shall be as designated in IS 5052 : 1993.

8.2 If stress-relieving treatment is required, this shall be stated in the order. The procedure and criteria for acceptance shall be as agreed to between the supplier and the purchaser.

9 TOLERANCES ON DIMENSIONS OF CASTINGS

The dimensions of the castings shall conform to customer's drawings and/or order. The wall thickness with machining allowance, where necessary, shall be stipulated in the customer's drawing and/or order. The castings shall be capable of being machined, where required, to the finished dimensions on the drawing.

10 SAMPLING

10.1 Chemical Analysis

10.1.0 *Lot*

The ingots/castings produced from the same cast of 1 000 kg or part thereof shall constitute a lot.

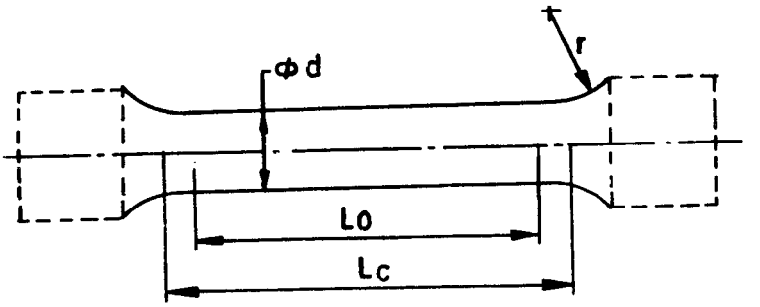
10.1.1 One sample for chemical analysis shall be selected from each cast or a lot as mutually agreed to between the supplier and the purchaser.

10.1.2 Special care shall be taken during sampling of the ingots or castings. In all cases, first drillings shall be discarded till a clean oxide-free surface is reached.

10.2 Tensile Test for Castings

10.2.1 One separately cast test sample shall be selected from each lot or heat-treatment batch not exceeding 1 000 kg.

10.2.1.1 Adequate number of separately cast test samples shall be prepared for tensile test from each cast so that it is possible to carry one test for each lot/heat-treatment batch and samples are available for retest.



Diameter d	= 10 mm
Gauge length L_o	= 50 mm
Radius at shoulder (minimum) r	= 10 mm
Minimum parallel length (L_c)	= 55 mm

FIG 7 STANDARD ROUND TEST PIECE

10.2.2 The metal for the test samples shall be taken from the crucible or ladle from which, the castings are poured.

10.2.3 *Treatment of Test Samples*

10.2.3.1 In case of non heat-treated castings, the test samples shall not be heat-treated, hammered, or otherwise treated (except by machining to the shape of the test piece) before they are tested.

10.2.3.2 In case of heat-treated castings the test samples shall be heat-treated with the castings they represent. The test samples before or after heat-treatment shall not be hammered or otherwise treated, except by machining to the shape of the round test piece, if necessary.

11 PRESSURE TEST

When required by the purchaser, each casting shall be pressure tested. Full details of the required/agreed test medium, test pressure and time under test shall be indicated in the test schedule. Castings shall not be impregnated or otherwise treated by a process designed to improve pressure-tightness except as indicated in the test schedule.

12 RETEST

12.1 If a sample selected fails to meet the requirements of the mechanical properties mentioned in **6**, two further test samples representing the same cast may be selected and tested. If one of the additional test samples meets the requirements of the test, the castings represented thereby shall be deemed to comply with this standard. If both of these test samples fail to meet the requirements, the castings represented thereby shall be rejected.

12.2 Alternatively for heat-treated castings, the supplier may reheat-treat the test samples along with same batch of casting. If both samples fail after reheat-treatment, no further retest is permissible.

13 MARKING

13.1 Ingots/castings shall be suitably marked for identification, with the following details:

a) Lot or heat-treatment batch number,

b) Alloy and temper designations, and

c) Indication of the source of manufacture,

13.2 If required, ingots/castings may also be colour coded in accordance with IS 2479 : 1981.

13.3 BIS Certification Marking

13.3.1 The material may also be marked with the Standard Mark.

13.3.2 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

14 TEST CERTIFICATE

Each consignment of ingots/castings should be accompanied by a test certificate containing details of alloy designation, lot/heat-treatment batch number and corresponding chemical composition, tensile properties (for castings only), etc.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*	*IS No.*	*Title*
504 : 1963	Methods of chemical analysis of aluminium and its alloys (*revised*)	5047 (Part 1) : 1986	Glossary of terms relating to aluminium and aluminium alloys: Part 1 Unwrought and wrought metals (*second revision*)
1500 : 1983	Method for Brinell hardness test for metallic materials (*second revision*)	5052 : 1993	Aluminium and its alloys – Temper designations (*first revision*)
1816 : 1979	Method for tensile test for light metals and their alloys (*first revision*)	6051 : 1970	Code for designation of aluminium and its alloys
2479 : 1981	Colour code for identification of aluminium and aluminium alloys for general engineering purposes (*second revision*)	7658 : 1975	Spectrographic analysis of aluminium
3658 : 1981	Code of practice for liquid penetrant flaw detection (*first revision*)	10259 : 1982	General condition of delivery and inspection of aluminium and aluminium alloy products
		11035 : 1984	Methods for spectrographic analysis of wrought aluminium alloys.

ANNEX B

(*Foreword*)

COMPARISON OF OLD AND NEW TEMPER DESIGNATIONS

Old Tempers	*New Tempers*	*Old Tempers*	*New Tempers*
M	M	WP	T6
W	T4	WS	T7
P	T5		

ANNEX C

(*Foreword*)

GUIDE TO THE SELECTION OF CAST ALUMINIUM AND ITS ALLOYS

C-0 The entire range of alloys has been classified into two groups, namely, commonly used alloys and special application alloys. The mode of division will enable the founder and the designer to pick up most appropriate alloy for a specific application.

C-1 COMMONLY USED ALLOYS

C-1.0 Majority of castings for common applications are produced from Al-Cu-Si alloys with 0.5 to 4 percent copper and 8 to 13 percent silicon. These alloys possess very good foundry characteristics and normally do not give rise to serious casting difficulties in the foundry.

For convenience this group has been divided into two subgroups as given in C-1.1 and C-1.2.

C-1.1 Sand, Gravity Die and Investment Casting Alloys

C-1.1.1 *Alloy 4223 and 4423*

These are the most versatile alloys. These have medium strength with good casting characteristics and suitable for general engineering applications, domestic and office equipment, household fittings, automobile components, electrical tools and switchgear. These alloys can be cast in thin or thick sections and also suitable for castings which are required to be pressure tight. Castings can be fully heat-treated to achieve higher physical properties.

C-1.1.2 *Alloy 4450*

High mechanical strength in the fully heat-treated condition and high resistance to corrosion of this alloy makes it versatile for a wide range of engineering equipments, for example, engine cylinder blocks and heads and other castings required in road transport.

Higher proof stress, greater hardness, pressure tightness and dimensional stability on temperature variation of this alloy are used with advantage in castings for valve-bodies, large fan blades, pneumatic tools, etc.

C-1.1.3 *Alloy 4528*

This is a new alloy widely used in automobile industries because of good castability and low-shrinkage. It can be used as cast as well as heat-treated condition.

C-1.1.4 *Alloy 4600*

Excellent castability and fluidity permits this alloy to be used in case of intricate and thin walled castings. In addition to good fluidity, its corrosion resistance is very good. Some of its applications include castings for water cooled manifolds, instrument cases, switch boxes, motor housings, castings used in marine applications, pumps, chemical and dye industries.

For castings forming a part of a welded assembly this alloy is the most suitable.

C-1.1.5 *Alloy 4600A*

The applications of this alloy are similar to those of 4600 except where high resistance to corrosion is required. In such applications 4600A should not be used, otherwise it has the same fluidity, castability and machinability.

C-1.2 Pressure Die Casting Alloys

C-1.2.1 *Alloy 4420*

This alloy has a high mechanical strength, greater hardness and better machinability than alloys 4520 and 4600. The casting characteristics are very good.

C-1.2.2 *Alloy 4520*

Most of the pressure die castings requiring medium strength are produced from this alloy. It has greater mechanical strength, hardness and better machinability than alloy 4600. For very thin walled castings, this alloy is to be preferred.

C-1.2.3 *Alloy 4600*

This alloy is recommended for those die castings for which the service operating conditions require a resistance to corrosion better than that offered by alloy 4420

or 4520. This alloy is most suitable for application like direct contact with chemicals, foodstuffs, sea water and those requiring highest resistance to corrosive atmosphere.

The ideal fluidity and freedom from hot-tearing of this alloy facilitates the production of complex castings of large surface area and their walls.

C-1.2.4 *Alloy 4600A*

The applications of this alloy are similar to those of 4600 except where high resistance to corrosion is required. In such applications 4600A should not be used, otherwise it has the same fluidity, castability and machinability.

C-1.2.5 *Alloy 4628*

This is new alloy widely used by automobile industries where high volume production die castings having thin wall are required. It has good castability, corrosion resistance, pressure tightness, low shrinkage and good weldability. However this alloy has poor machinability.

C-2 SPECIAL APPLICATION ALLOYS

C-2.0 Castings demanding special characteristics which are not provided in the commonly used alloys have been listed below. It may be noted that many of the alloys in this category give more foundry problems and are, therefore, limited to specified application.

C-2.1 Alloys 1950 and 1900

These alloys have high electrical conductivity and therefore used in fittings required for electrical transmission. Also suitable for food and chemical industries. They have poor castability due to high shrinkage and hot tearing.

C-2.2 Alloy 2280

Possesses high strength and good ductility in the fully heat-treated condition. Applications are reciprocating parts of engines, flywheel housing and propellers, artificial limb, moulding boxes and other castings requiring high strength under stress. The alloy is hot short.

C-2.3 Alloy 2285

It is also known as 'y' alloy and possesses good mechanical strength at elevated temperatures. It requires special casting techniques. The alloy is normally used for pistons and cylinder heads.

C-2.4 Alloy 2550

This alloy is specially suitable for castings for hydraulic equipment. It has excellent machinability.

C-2.5 Alloy 4223A

Possesses high shock resistance and tensile strength. Suitable for structural components and castings for heavy duty service in road transport vehicles.

C-2.6 Alloy 4225

It has high strength and greater hardness which is maintained at temperatures up to 200° C. It is good for pressure tightness.

C-2.7 Alloy 4300

It has good resistance to chemical and atmospheric attack. It is widely used for electrical household appliances, for example, steam-irons, waffle irons, electric floor polishers and vacuum cleaners. Also used for utensils and architectural castings.

C-2.8 Alloy 4323

It is specially suitable for castings required to have a combination, in the as-cast conditions, of high proof stress and hardness with good machinability and castability. It gets aged at room temperature and is very good for heavy duty automotive parts.

C-2.9 Alloy 4525

Possesses good strength at elevated temperatures and low coefficient of expansion. Used for low pressure die castings such as scooter components.

C-2.10 Alloy 4635

It has a fluidity and corrosion resistance of alloy 4300 with higher mechanical strength and hardness. It is extensively used for low pressure die castings such as scooter parts.

C-2.11 Alloy 4652

Low thermal expansion and good strength at elevated temperatures. Used for pistons, mainly for internal combustion engines.

C-2.12 Alloy 5230

Excellent resistance to corrosion and excellent surface finish makes it suitable for castings for marine, food processing and decorative applications. It is the most suitable alloy for decorative anodizing. Typical applications are window hardware, ash trays and ornamental hardware. The alloy is susceptible to oxidation in molten condition and has high shrinkage.

C-2.13 Alloy 5500

When solution treated, this alloy has the highest tensile strength and good shock resistance together with excellent corrosion resistance and machinability. Suitable for castings requiring maximum toughness. Typical applications are highly stressed castings used in marine and mining equipments.

The alloy becomes susceptible to stress corrosion at higher temperature if subjected to stresses in excess of design loads. The alloy requires special foundry techniques to ensure internal soundness and chemical composition limits.

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(*Page* 2, *Table* 1, *Sl No.* 7, *col* 9) — Substitute '0.15' *for* '40.15'.

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